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Elder Sense: A Smart Elderly Care System for Medication Monitoring and Healthcare Management

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ABSTRACT:

Elderly individuals often face difficulties in managing medications, maintaining health records, and receiving timely support from caregivers and healthcare professionals. To address these challenges, this paper presents **Elder Sense**, a smart digital elderly healthcare system designed to support medication management, health monitoring, and caregiver and doctor interaction through an integrated platform. The system provides role-based access for elderly users, caregivers, and doctors, enabling personalized management of healthcare information. Key functionalities include medication scheduling and reminders, medication adherence monitoring, prescription management, health and symptom recording, health reports, an AI-assisted healthcare support module, and caregiver monitoring. The system also provides healthcare-related information and supports communication between elderly users and their caregivers and healthcare providers. By integrating these functionalities into a single platform, Elder Sense aims to reduce difficulties associated with manual medication management, improve access to relevant health information, and support continuous elderly care. The proposed system demonstrates the potential of modern web technologies and artificial intelligence to support the development of a user-friendly digital solution for elderly healthcare management.

Keywords: Elderly Care, Medication Management, Medication Adherence, Health Monitoring, Artificial Intelligence, Caregiver Support, Digital Healthcare, Healthcare Management.

1. INTRODUCTION

The elderly population often requires regular medication, continuous health monitoring, and timely assistance from caregivers and healthcare professionals. Managing multiple medicines, remembering dosage schedules, maintaining health information, and communicating health conditions can become difficult for elderly individuals. Traditional methods such as manual records and reminders may not provide an integrated solution for these needs.

Elder Sense is a smart digital elderly healthcare system developed to support medication management, health monitoring, and communication between elderly users, caregivers, and doctors. The system provides features such as medication scheduling and reminders, adherence monitoring, prescription management, health and symptom recording, reports, and AI-assisted healthcare support. By integrating these functions into a single platform, Elder Sense aims to provide a convenient and user-friendly approach to elderly healthcare management.

2. PROBLEM STATEMENT

Elderly individuals may experience difficulties in managing multiple medications, remembering dosage schedules, maintaining health records, and accessing timely assistance. Caregivers may also face challenges in continuously monitoring medication adherence and health conditions. Traditional methods often rely on manual tracking and may not provide a centralized platform for elderly users, caregivers, and doctors. Therefore, there is a need for an integrated digital system that can simplify medication management, support health monitoring, provide timely reminders, and improve communication between elderly individuals, caregivers, and healthcare professionals.

3. OBJECTIVES

The main objectives of the proposed Elder Sense system are:

1. To develop a user-friendly digital platform for elderly healthcare management.

2. To provide medication scheduling, reminders, and adherence monitoring to help elderly users manage their medicines effectively.
3. To enable elderly users to record and monitor health information such as symptoms and vital signs.
4. To provide caregivers with relevant information for monitoring elderly users and supporting their healthcare needs.
5. To facilitate interaction between elderly users, caregivers, and doctors through a centralized platform.
6. To provide an AI-assisted healthcare support module for accessing relevant health information and assistance.
7. To integrate different elderly healthcare services into a single digital platform for convenient and continuous care.

4. LITERATURE SURVEY

[1] D. C. Das et al., "The Role of Artificial Intelligence in Medication Management for Older Adults: A Systematic Review," *Aging Medicine*, vol. 9, no. 2, pp. 196–213, 2026. The study reviewed the use of Artificial Intelligence in medication management for older adults. It highlighted the potential of AI for medication adherence, personalized support, medication-related risk identification, and automated assistance. The study also discussed challenges related to usability, privacy, trust, and integration with healthcare systems.

[2] K. T. Haile et al., "Digital Health Interventions to Improve Medication Adherence Among Older Adults: A Systematic Review," *Australasian Journal on Ageing*, vol. 45, no. 3, article e70206, 2026. The study examined digital health interventions designed to improve medication adherence among older adults. It identified digital reminders, mobile applications, and interactive technologies as approaches that may support medication adherence. The findings support the use of digital medication reminders and monitoring features in elderly healthcare systems.

[3] O. Salmensuu, "Effects of Using Medication Reminder Technologies by Home-Dwelling Older Citizens: A Systematic Review," *Age and Ageing*, vol. 55, no. 2, article afag007, 2026. This study investigated medication reminder technologies used by older adults living at home. The review examined their effects on health outcomes, service use, and user and caregiver experiences. It highlighted the potential benefits of medication reminder technologies while noting the need for further high-quality research.

[4] K. Bringhurst et al., "Artificial Intelligence in the Management of Polypharmacy Among Older Adults: A Scoping Review," *Cureus*, vol. 17, no. 8, e90867, 2025. The study explored the application of Artificial Intelligence in managing polypharmacy among older adults. It highlighted the potential of AI-based technologies to support medication-related decision-making and identify risks associated with multiple medications. The study also emphasized the need for further research regarding the safety, accuracy, and practical implementation of AI-based systems.

5. PROPOSED SYSTEM AND METHODOLOGY

Elder Sense is a web-based elderly healthcare management system designed to provide medication management, health monitoring, caregiver support, and healthcare assistance through a single platform. The system follows a role-based approach in which elderly users, caregivers, and doctors can access features according to their respective roles.

The proposed Elder Sense system integrates medication management, health monitoring, medication adherence, caregiver support, doctor interaction, and AI-assisted healthcare support into a unified digital platform. The methodology describes the sequence of activities performed by different users and explains how healthcare information is collected, processed, stored, and presented through the system. The overall working process of the proposed system is illustrated in the flowchart shown in Fig. 1.

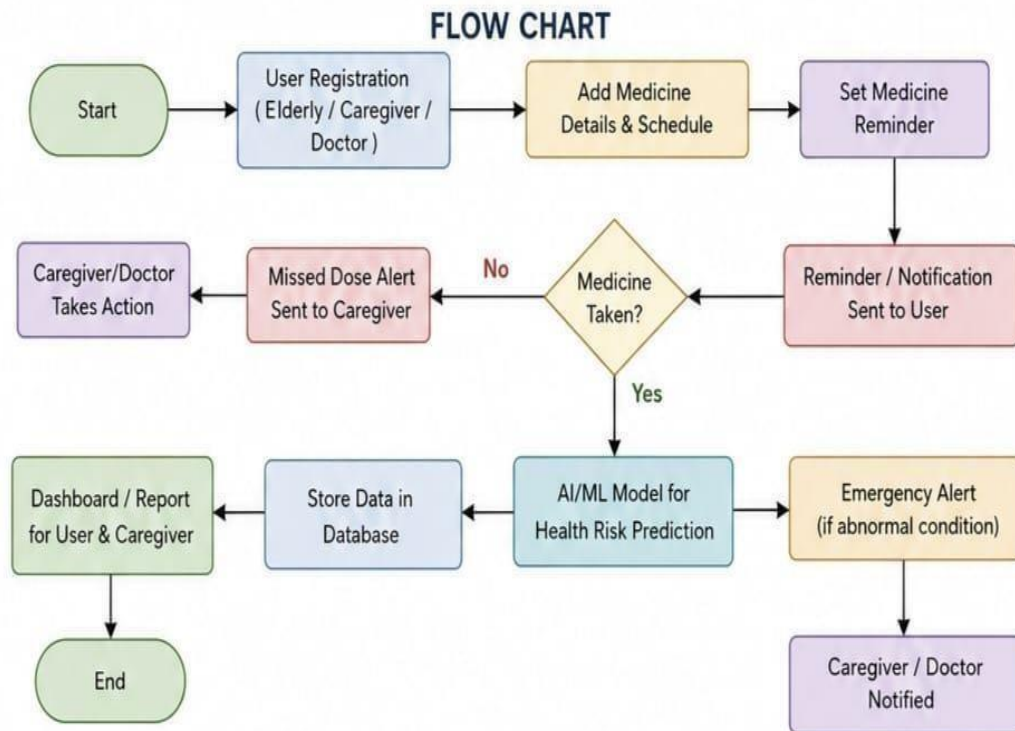


Fig. 1. Methodology Flowchart of the Elder Sense System

6. SYSTEM ARCHITECTURE

The proposed Elder Sense system follows a layered and modular architecture consisting of the user interface, application services, database, and healthcare support modules. These components work together to provide a centralized platform for elderly healthcare management.

The system supports three primary user roles: elderly users, caregivers, and doctors. Role-based access is provided according to the responsibilities of each user. Elderly users can manage medications, prescriptions, symptoms, and health information. Caregivers can monitor relevant medication adherence, health information, and updates of connected elderly users. Doctors can access authorized patient information and healthcare records for healthcare-related interactions.

The frontend layer provides the user interface through which users interact with the different modules of the system. The application or backend layer manages authentication, data processing, business logic, and communication between the frontend and database. The database layer stores user information, medication details, prescriptions, health records, and medication adherence data.

The healthcare support layer includes medication management, medication adherence monitoring, health monitoring, caregiver support, doctor interaction, and AI-assisted healthcare support. Each module performs a specific function while communicating with the application services and database. This modular design helps organize healthcare information and provides appropriate access to different users.

The overall interaction between users, application services, database, and healthcare support modules is illustrated in the system architecture shown in Fig. 2.

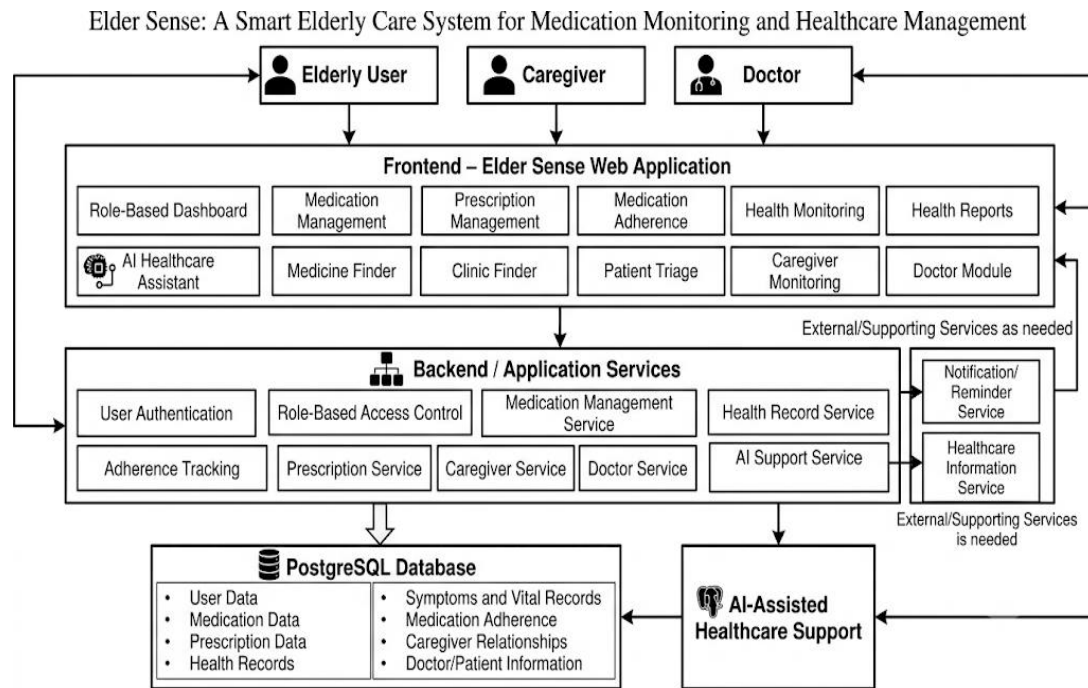


Fig. 2. System Architecture of the Proposed Elder Sense System

6.1 USER ROLE MANAGEMENT

Elder Sense provides role-based access for elderly users, caregivers, and doctors. Each user can access features according to their role. Elderly users can manage medicines and health information, caregivers can monitor elderly users, and doctors can view authorized patient information.

6.2 MEDICATION MANAGEMENT

The medication module allows users to add medicine names, dosage, frequency, and schedules. The system provides reminders for scheduled medicines and stores medication information in the database. Prescription details can also be maintained for easy access

6.3 MEDICATION ADHERENCE MONITORING

The system records medication activities and monitors whether scheduled medicines are taken. Adherence information is stored and displayed through the dashboard. Caregivers can view relevant medication status of connected elderly users.

6.4 HEALTH MONITORING

The health monitoring module allows users to record symptoms, vital signs, and other health information. The data is stored in the database and displayed through the dashboard and reports. Authorized caregivers and doctors can access relevant health records.

6.5 AI-ASSISTED HEALTHCARE SUPPORT

The AI-assisted module provides general health-related information and responses to user queries. It supports users with basic healthcare information and medication-related queries. The module is intended for assistance and does not replace professional medical advice.

6.6 CAREGIVER SUPPORT

The caregiver module allows caregivers to monitor connected elderly users. They can view relevant medication adherence, health information, and updates through the dashboard. This supports timely assistance and remote elderly care.

6.7 DOCTOR SUPPORT

The doctor module allows authorized doctors to access relevant patient information and health records. Doctors can review medication details, health information, and other available patient data through the system. This helps doctors understand the patient's recorded health information and provide appropriate healthcare support. The module also improves communication between elderly users and healthcare professionals.

6.8 INTEGRATED HEALTHCARE MANAGEMENT

Elder Sense integrates medication management, medication adherence, health monitoring, AI-assisted support, caregiver monitoring, and doctor interaction into a single platform. The system stores and organizes healthcare information in a centralized database and provides role-based access to users. This integration makes elderly healthcare management more convenient, organized, and accessible.

7. IMPLEMENTATION AND TECHNOLOGIES USED

Elder Sense is being developed as a web-based elderly healthcare management system using modern web technologies. The frontend, backend, database, and AI-assisted components work together to provide the required healthcare functionalities.

7.1 FRONTEND TECHNOLOGIES

The frontend is developed using **Next.js** and **React** with **TypeScript**. **Tailwind CSS** is used to create a responsive and user-friendly interface. Libraries such as **Lucide** and **Recharts** are used for icons and data visualization.

7.2 BACKEND AND DATABASE

The backend manages authentication, application logic, and communication between the frontend and database. **FastAPI** is used for backend services, while **Prisma ORM** is used for database operations. **PostgreSQL** is used to store user information, medication details, prescriptions, health records, and other system data.

7.3 AI-ASSISTED MODULE

An AI-assisted healthcare module is integrated into the system to provide responses to general healthcare-related queries. The module provides informational support through an interactive AI interface and assists users in accessing relevant healthcare information.

7.4 AUTHENTICATION AND DATA MANAGEMENT

The system uses role-based authentication to provide appropriate access to elderly users, caregivers, and doctors. Healthcare information is stored and retrieved from the database according to the user's authorized access. This approach helps organize healthcare data and ensures that users can access the information relevant to their respective roles.

8. RESULTS AND DISCUSSION

The proposed Elder Sense system provides an integrated interface for elderly healthcare management. The prototype interfaces illustrate the main modules of the system, including the elderly user dashboard, medication management, medication adherence monitoring, and health monitoring. These interfaces are designed to provide organized access to healthcare information and support interaction among elderly users, caregivers, and doctors.

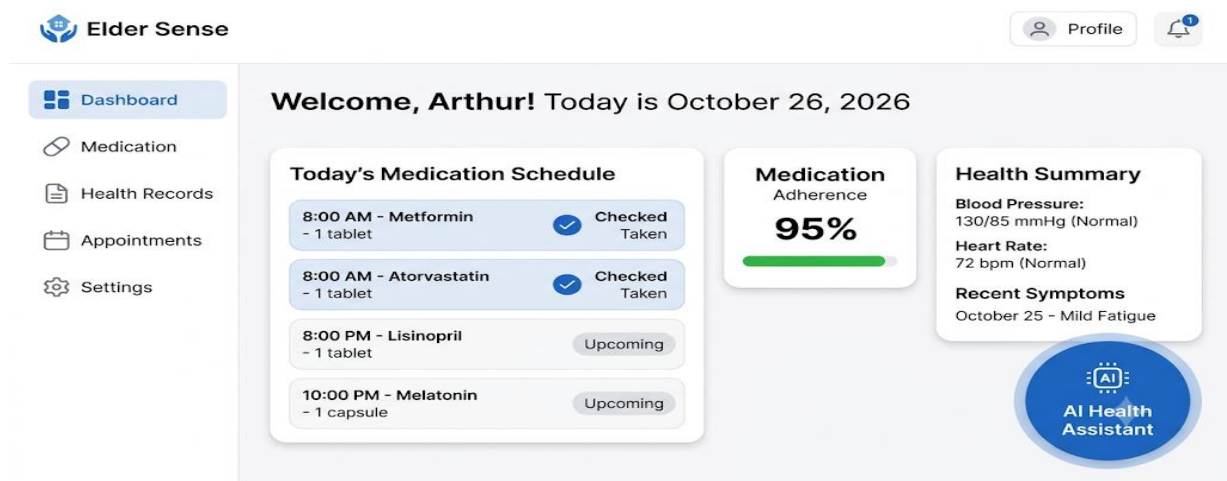


Fig. 3. Prototype Interface of the Elder Sense elderly user dashboard

The elderly user dashboard is designed as the main interface for accessing the healthcare services proposed in the Elder Sense system. It presents important healthcare information in an organized manner, allowing users to access their medication schedules, health information, adherence status, notifications, and other available features. The dashboard is designed with a simple and accessible interface to support ease of use for elderly users.

The dashboard provides a centralized view of medication-related activities and recorded health information. Users can navigate to different modules for managing medicines, viewing prescriptions, recording symptoms and vital signs, and accessing AI-assisted healthcare support. The interface also helps users access relevant updates and healthcare information from a single platform, reducing the need to manage these activities separately.

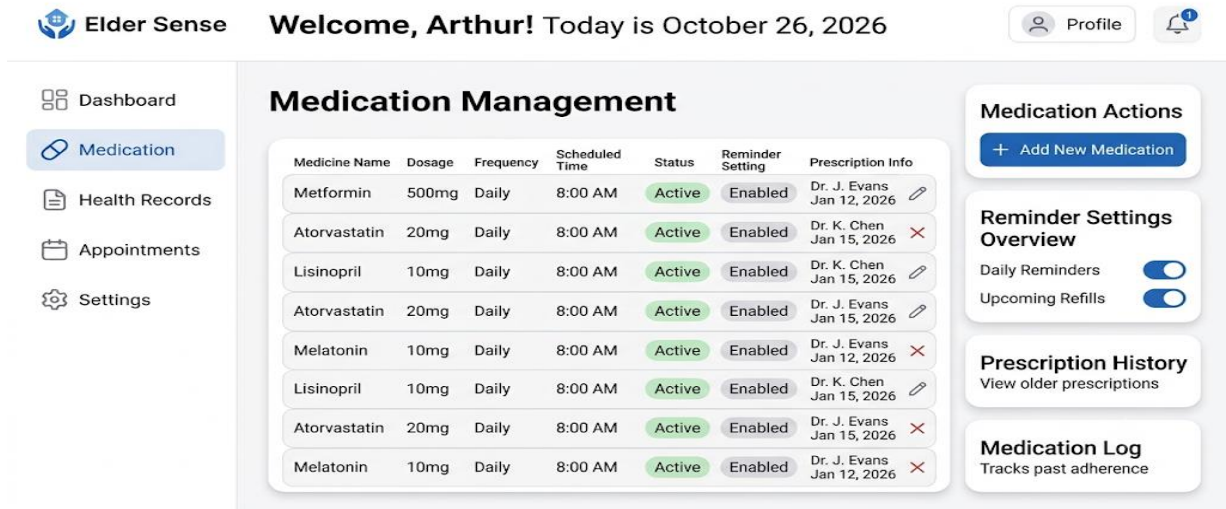


Fig. 4. Prototype Interface of the Elder Sense medication management module

The medication management module is designed to help elderly users organize and maintain their daily medication information. Users can enter details such as medicine name, dosage, frequency, and scheduled time. Prescription-related information can also be maintained within the system for easy reference.

The module provides an organized view of the user's medication schedule and helps users keep track of their prescribed medicines. Scheduled medication information can be accessed through the dashboard, allowing users to manage their daily medication activities more conveniently. The centralized storage of medication information also allows authorized caregivers and doctors to access relevant records when required.

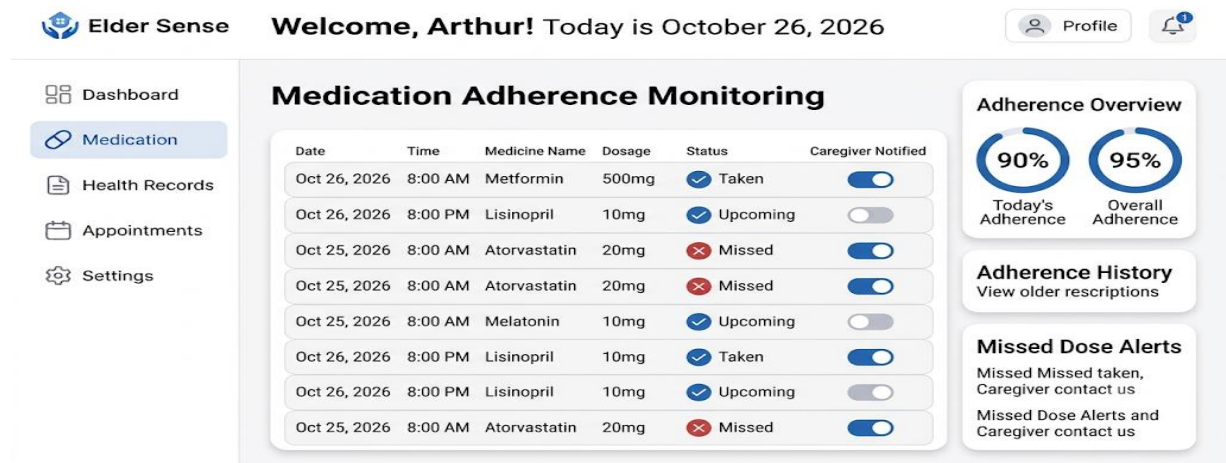


Fig. 5. Prototype Interface of the Elder Sense medication adherence monitoring module

The medication adherence module records medication-taking activities and displays adherence status through the dashboard. It helps users and caregivers monitor scheduled and missed medication activities. The recorded adherence information can be stored and presented through the dashboard for easy monitoring.

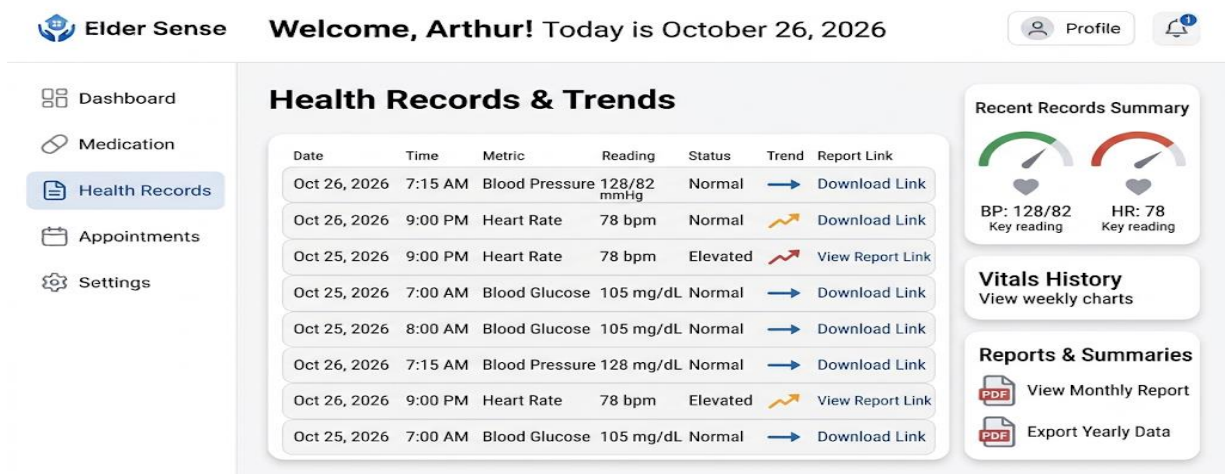


Fig. 6. Prototype Interface of the Elder Sense health monitoring and reports module

The health monitoring module allows users to record health information such as symptoms and vital signs. The collected information can be organized and displayed through dashboards and reports for easier monitoring.

9. FUTURE SCOPE

The Elder Sense system can be further enhanced by integrating wearable devices and IoT sensors for continuous health monitoring. Advanced machine learning models can be incorporated for personalized health-risk assessment using larger and validated datasets. Future versions can also include mobile application support, improved emergency alert mechanisms, multilingual support, and integration with healthcare providers. These enhancements can improve the scalability, accessibility, and usefulness of the system for elderly healthcare management.

10. CONCLUSION

Elder Sense is a web-based elderly healthcare management system designed to support medication management, medication adherence monitoring, health record management, caregiver support, doctor interaction, and AI-assisted healthcare assistance. The system provides role-based access and integrates these healthcare functions into a centralized platform. The proposed system aims to make elderly healthcare management more organized, accessible, and convenient for elderly users, caregivers, and healthcare professionals. Future enhancements can further improve the system through advanced health-risk assessment, wearable device integration, and mobile application support.

11. REFERENCES

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